AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1 (Currently amended): A high-frequency heating apparatus for driving a magnetron, comprising:

a DC power supply including an AC power supply, a rectifier circuit for rectifying a voltage of the AC power supply, and a smoothing capacitor for smoothing an output voltage of the rectifier circuit;

a series circuit including two semiconductor switching devices, the series circuit being connected in parallel to the DC power supply;

a resonance circuit ~~connected to~~ having a primary winding of a leakage transformer and a capacitor, which are connected to each other, one end of the resonance circuit being connected to a middle point of the series circuit while the other end of the resonance circuit is connected to one end of the DC power supply;

a drive unit for driving each of the semiconductor switching devices~~;~~

~~a frequency-modulated signal generation unit operable to transmit a frequency-modulated signal;~~

~~a lowest frequency limiting unit for establishing a lowermost limit of a frequency at~~ alternatively or drives the semiconductor switching devices so as to provide a period in which the semiconductor switching devices are~~to be operated, wherein the lowest limit frequency limiting unit establishes the lowermost limit as a first frequency when the high-frequency heating apparatus is activated and gradually lowers the lowermost limit to a second frequency that is less than the first frequency in response to activation of the high-frequency heating apparatus~~ turned off concurrently;

~~a comparison unit for comparing the frequency-modulated signal to the lowermost limit as the lowermost limit is being gradually lowered by the lowest frequency limiting unit, wherein the comparison unit transmits a comparison result signal indicating which of the frequency-modulated signal and the lowermost limit is greater, the comparison result signal to be communicated to the drive unit for controlling operation of the semiconductor switching devices;~~

a rectifier unit connected to a secondary winding of the leakage transformer;

a magnetron connected to the rectifier unit;[[and]]

a dead time generation circuit that generates a dead time control signal for turning off the semiconductor switching devices concurrently[[,]]

an error signal generation circuit generating an error signal based on a difference between an input current of the AC power supply and the reference current; and

a frequency-modulated signal generation circuit that outputs to the dead time generation circuit a frequency-modulated signal obtained by controlling an amplitude of a rectified voltage/rectified current signal output from the DC power supply based on the error signal,

wherein the drive unit ~~is operable to drive~~ limits the lowest frequency of a frequency with which the semiconductor switching devices ~~based on the comparison result signal transmitted by the comparison unit~~ are driven, so that the lowest frequency is set to be high at the beginning of operation of the high frequency heating apparatus, and the lowest frequency is set to be lower gradually thereafter.

Claims 2-4 (Canceled)

Claim 5 (Currently amended): The high-frequency heating apparatus according to claim [[4]]32, wherein the lowest frequency limiting circuit has a capacitor, the capacitor is charged during suspension of the high-frequency heating apparatus, and as soon as the high-frequency heating apparatus begins to operate, a voltage of the capacitor is supplied to the dead time generation circuit, and charges accumulated in the capacitor are discharged.

Claim 6 (Currently amended): The high-frequency heating apparatus according to claim [[4]]1, wherein the dead time generation circuit generates a fixed or marginally increased dead time regardless of a switching frequency.

Claim 7 (Previously presented): The high-frequency heating apparatus according to claim 1, wherein the dead time generation circuit generates a dead time increased in accordance with increase of a switching frequency.

Claim 8 (Original): The high-frequency heating apparatus according to claim 7, wherein the dead time generation circuit fixes or marginally increases the dead time at a switching frequency not higher than a predetermined frequency.

Claim 9 (Previously presented): The high-frequency heating apparatus according to claim 7, wherein the dead time generation circuit suddenly increases the dead time at a switching frequency not lower than a predetermined frequency.

Claims 10-12 (Canceled)

Claim 13 (Previously presented): The high-frequency heating apparatus according to claim 1, wherein the dead time generation circuit generates a dead time based on positive and negative offset voltages each varying with a first inclination in proportion to increase of a switching frequency and varying with a second inclination when the switching frequency reaches a predetermined frequency or higher.

Claim 14 (Previously presented): The high-frequency heating apparatus according to claim 1, wherein the dead time generation circuit includes a VCC power supply, a duty control power supply, a first current varying in proportion to a switching frequency, a second current flowing at a predetermined frequency at beginning and varying in proportion to the switching frequency, a third current obtaining by and

multiplying a combining current of the two currents by a predetermined coefficient, and a upper and lower potential generation unit for generating a set of upper and lower potentials obtained by adding positive and negative offset voltages proportional to the third current, to the duty control power supply respectively, and a dead time is generated based on the set of upper and lower potentials.

Claims 15-31 (Canceled)

Claim 32 (New): The high-frequency heating apparatus according to claim 1, further comprising:

another series circuit including two semiconductor devices, wherein each of the series circuit and the another series circuit being connected in parallel to the DC power supply,

wherein the other end of the resonance circuit is connected to the one end of the DC power supply through a middle point of the another series circuit; and

wherein the drive unit drives the semiconductor switching devices of the another series circuit alternatively or drives the semiconductor switching devices of the another series circuit so as to provide a period in which the semiconductor

switching devices of the another series circuit are turned off concurrently.

Claim 33 (New): The high-frequency heating apparatus according to claim 1, further comprising:

another series circuit including two capacitors, the series circuit and the another series circuit being connected in parallel to the DC power supply,

wherein the other end of the resonance circuit is connected to the one end of the DC power supply through a middle point of the another series circuit.

Claim 34 (New): The high-frequency heating apparatus according to claim 1, further comprising:

an error signal generation circuit for generating an error signal from a difference between an input current of the AC power supply and a reference current; and

a frequency-modulated signal generation circuit for correcting a rectified voltage/rectified current obtained by rectifying the AC power supply, based on an output (error signal) of the error signal generation circuit, wherein an output of the frequency-modulated signal generation circuit is supplied to the dead time generation circuit;

wherein a lowest frequency limiting circuit is inserted between the frequency-modulated signal generation circuit and the dead time generation circuit, the lowest frequency limiting circuit supplies a limited frequency to the dead time generation circuit based on the output signal of the frequency-modulated signal generation circuit so that a set frequency of the lowest frequency limiting circuit is set to be higher than the output of the frequency-modulated signal generation circuit at the beginning of operation of the aforementioned high-frequency heating apparatus, and in accordance with time having passed since the beginning of operation, the limited frequency is lowered gradually, while with lowering of the limited frequency, a signal higher in switching frequency of the limited frequency and the output signal of the frequency-modulated signal generation circuit is selected as a signal to be supplied to the dead time generation circuit in accordance with time having passed, so that the selected signal is changed over gradually to the output signal of the frequency-modulated signal generation circuit.

Claim 35 (New): The high-frequency heating apparatus according to claim 8, wherein a fixed or marginally increased value of the dead time at a switching frequency not higher than

a predetermined frequency or a suddenly increased value of the dead time at a switching frequency not lower than a predetermined frequency is variable.

Claim 36 (New): The high-frequency heating apparatus according to claim 8, wherein a value of the predetermined switching frequency is variable.

Claim 37 (New): The high-frequency heating apparatus according to claim 1, wherein the dead time generation circuit increases a dead time stepwise with increase of a switching frequency.

Claim 38 (New): The high-frequency heating apparatus according to claim 14, wherein input power or input current control is performed by changing at least one of a voltage of the duty control power supply and the switching frequency.